The New Hampshire Climate Change Policy Task Force

New Hampshire Climate Action Plan

A Plan for New Hampshire's Energy, Environmental and Economic Development Future

Appendix 4.7: Protect Natural Resources (Land, Water and Wildlife) To Maintain the Amount of Carbon Fixed or Sequestered

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NH Department of Environmental Services
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Recommended Actions

AFW Action 1.2 – Invest in Forests to Maximize Carbon Sequestration

Summary

It is critical that we sustain the natural carbon sink provided by forests and their capacity to remove CO_2 from the atmosphere. Through photosynthesis, New Hampshire's forests take up the equivalent of 25%of the state's manmade CO_2 emissions annually[1]. Minimizing forest land conversion to non-forested uses will be a key component of any successful emission reduction strategy - Note that 20% of global manmade CO_2 emissions are caused by conversion of forest land to non-forested uses. Public policy objectives should include encouraging forest land owners to manage their forests sustainably for the dual purposes of producing forest products and maximizing carbon storage. New Hampshire has had considerable success in conserving large blocks of contiguous forest land through perpetual easements – an important tool in maintaining the carbon sink that New Hampshire's forests presently provide and one which should be aggressively promoted in the presence of growing, competing land use pressures.

Program Description

1. Mechanism *(i.e., how the policy or program achieves the desired result)*
    a. Conservation Easements – Perpetual easements designed to prevent subdivision and development of land are and should continue to be a primary tool to conserve the carbon storage capacity of unmanaged and managed forests.
    b. Carbon Leases – The concept of acquiring a term lease for the primary purpose of securing the carbon storage capacity of forest land should be pilot tested to determine whether it should become a proactive public policy of the state. The State would make a lease payment of a period of time to a landowner for a negotiated price to store a minimum amount of carbon on the landowner's land. The value of the lease would need to be appraised and the terms of the lease would have to assure that the minimum storage leased is maintained and documented.
    c. New Forest Management Strategies – The state should encourage private forest land owners who manage their land for the production of forest products to voluntarily seek third party certification of their management practices and to consider adopting management practices that store more carbon than otherwise would be stored under a business-as-usual scenario (for example, by using longer rotations for harvesting); if enough landowners adopted certification and carbon storage management practices, it may be possible to increase the size of New Hampshire's natural carbon sink. The State should study and assess the benefits of enrolling its own 200,000 acres of state forests into one of the international certification programs.
    d. Land Use Regulation – Municipal land use policies that encourage cluster development and discourage cookie cutter subdivisions reduce forest land conversion; the application of impact fees to minimize forest land conversion for development is one tool that may advance this objective.

2. Implementation Plan *(i.e., how to implement the specific policy or program)*
    a. Conservation Easements – Create a new state initiative to encourage large forest land owners to protect working forests and unmanaged forests with perpetual conservation easements; resources: new State dollars should be used to leverage non-state dollars to collaborate in attaining this goal; barriers: state capacity to commit funds and some resistance among larger landowners to perpetual easements
    b. Carbon Lease Pilot Project – Create a pilot program within the State Treasury Department to test the marketability of leasing large blocks of forest land for their carbon storage capacity and the marketability of conservation easements with the primary objective of storing carbon; resources: additional staffing capacity at Treasury and program dollars to invest in these instruments would be

[1] EPA State and Local Greenhouse Inventory Tool

needed; program dollars for such work could come from revenues generated by the sale of carbon allowances under the Regional Greenhouse Gas Initiative as well as other carbon related taxes and fees; barriers: carbon leasing is an idea that has not been tested; society is used to getting the ecological service of carbon storage without having to pay for it.

c. New Forest Management Strategies – Encourage forest land owners that manage their land for forest products to adopt management strategies that increase the amount of carbon their forests store while continuing to manage the forest resource sustainably; resources: carbon leasing dollars could be targeted to those landowners willing to make such changes in resource management; barriers: forest land owners will insist that such an initiative be voluntary, which may be more of a limitation than a barrier.

d. Land Use Regulation – Provide municipalities with statutory incentives to adopt carbon friendly zoning ordinances, (for example) by enabling municipalities to charge impact fees on projects based on the net loss of forest carbon storage capacity; redevelopment of existing structures would pay no fee while projects consuming existing forest land would pay a relatively higher fee; resources: added staffing at the Governor's Office of Energy and Planning and at Regional Planning Commissions would be needed to supplement work already ongoing in this arena; barriers: absence of financial resources and resistance of the development community (practitioners and regulatory bodies).

3. Parties Affected by Implementation *(i.e., residents, businesses, municipalities, etc.)*

   a. Conservation Easements

      i. *Parties responsible for implementation*: State land conservation organizations, NGO land trusts and municipal conservation commissions.

      ii. Par*ties paying for implementation:* Federal, state, and/or municipal taxpayers and private donors.

      iii. *Parties benefiting from implementation:* All New Hampshire citizens.

   b. Carbon Lease Pilot Project:

      i. *Parties responsible for implementation:* State Treasurer and NGO land trusts.

      ii. *Parties paying for implementation:* Consumers.

      iii. *Parties benefiting from implementation:* All New Hampshire citizens.

   c. New Forest Management Strategies

      i. *Parties responsible for implementation:* Owners of forest land, DRED/Division of Forest & Lands, NGOs with forestry related missions.

      ii. *Parties paying for implementation*: Owners of forest land and consumers of the forest products the lands produce.

      iii. *Parties benefiting from implementation:* All New Hampshire citizens.

   d. Land Use Regulation

      i. *Parties responsible for implementation:* Municipalities and regional planning commissions

      ii. *Parties paying for implementation:* Developers and consumers of new residential and commercial buildings and structures

      iii. *Parties benefiting from implementation:* All New Hampshire citizens

4. Related Existing Policies and Programs *(i.e., those that address similar issues without interacting)*

   a. Conservation Easements – LCHIP, municipalities, and NGO land trusts have existing capacity and resources (both presently limited by available dollars) to secure conservation easements on forest land

b. Carbon Lease Pilot Project – There is no existing policy or program in place specifically targeted at this goal; the closest is the Current Use Program that reduces property tax liability for those who use land for forestry or agricultural purposes.

c. New Forest Management Strategies – In New Hampshire forest management practices are voluntary; many landowners use the publication *Good Forestry in the Granite State* (1998) as the standard for best management practices governing timber harvesting; *GFGS* presently has no guidance on forest management practices to sustain or grown carbon storage.

d. Land Use Regulation – Considerable effort is already underway to promote the use of cluster development for residential and commercial development of land, regulated largely at the local level.

5. Complementary Policies *(i.e., those that achieve greater reductions through parallel implementation)*

   a. Conservation Easements – Other than 4 above, none

   b. Carbon Leases – None

   c. New Forest Management Strategies – The Regional Greenhouse Gas Initiative (RGGI; EGU Action 2.2) is considering a policy change that would allow the regulated community to invest in offset projects, including forest management projects that meet the five goals for all offset projects: offsets must be *real, additional, verifiable, enforceable and permanent*. If adopted by RGGI and/or by a future federal cap and trade program), forest management offset projects that secure additional carbon reductions through forest management activities (like extended rotation) will likely provide a market to working forest land owners that does not exist today for storing additional carbon on their timber land.

   d. Land Use Regulation – Integrating the carbon storage values associated with avoiding forest land conversion would not be inconsistent with policies and programs already underway within many municipalities.

6. Timeframe for Implementation:

   a. Conservation Easements – Ongoing, with potential to grow with greater State appropriation of program dollars to accelerate forest land conservation

   b. Carbon Leases – A pilot project could be initiated today; any broader program would require new dollars and 6-12 months of program design and development (based on experience with the pilot project) to move forward.

   c. New Forest Management Strategies

      i. Voluntary practices that achieve additional carbon storage could be integrated into the update of *Good Forestry in the Granite State* currently underway, and frameworks for maximizing carbon storage could be in place within a year;

      ii. Owners of large blocks of timberland could be encouraged by the State to seek independent third party certification of their management practices, which assures sustainable management of the timber resource and sustainable capacity of the certified woodland to store carbon;

      iii. New Hampshire representatives on the RGGI steering committee should support the proposal to permit forest management offset projects, a proposal that will shortly be under active consideration by RGGI; successful implementation is contingent on competitive markets being available to invest in such projects;

      iv. Compensating land owners who increase their storage of carbon by implementing changes to their management practices with short term carbon leases (see b above) could be implemented upon the availability of dollars to invest in such leases.

   d. Land Use Regulation – Ongoing at municipalities and at RPCs; authority to enable carbon friendly impact fees may require amendments to existing state statutes.

7. Anticipated Timeframe of Outcome
    a. Conservation Easements – Immediate
    b. Carbon Leases – Three years to pilot, develop and fund; benefits accrue as investments are made
    c. New Forest Management Strategies – Benefits are cumulative; once management practice are implemented, the full benefits may be realized over a 100 year period
    d. Land Use Regulation – Immediate if measured in forest conversion avoided

Program Evaluation

1. Estimated CO_2 Emission Reductions
    a. Short-term (2012): 0.17 MMTCO2e/year
    b. Mid-term (2025): 0.33 MMTCO2e/year
    c. Long-term (2050): 0.52 MMTCO2e/year

2. Economic Effects
    a. Costs
        i. Implementation Cost: Moderately high ($125 million to $500 million)
        ii. Timing: Constant / even
        iii. Impacts: Local government
    b. Savings
        i. Potential Economic Benefits: Moderate ($25 million to $125 million)
        ii. Timing: Low short-term / mostly long term
        iii. Impacts: Evenly distributed

3. Other Benefits/Impacts
    a. *Environmental*: Intact tracts are forest are better able to sustain biological diversity and healthy wildlife populations and play a role in the overall provision of ecosystem goods and services such as water supply provision.
    b. *Health*: Forests may also contribute to human health through beneficial impacts on air quality and mental health.
    c. *Social*: Sustainable backdrop for recreation and tourism industry. To the extent forested lands can be protected and remain productive, we increase the chance of maintaining the iconic character of our state and its natural resource industries in the long-term.
    d. *Economic*: Sustain the short and long term stable market for full range of forest products.

4. Potential for Implementation (*i.e., including challenges, obstacles and opportunities*)
    a. *Technical*: Opportunity to coalesce scientific thought and enhance forest management.
    b. *Economic*: Rising land values have made purchase of conservation easements relatively more expensive in recent years.
    c. *Statutory/Regulatory*: Opportunity to amend existing statutes and rules to reduce carbon emissions.
    d. *Social*: Local, state and federal conservation easement programs are dependent on the support of their governing bodies.

5. Other Factors of Note:

6. Level of Group Interest: High

7. References:

AFW Action 1.3 – Promote Durable Wood Products

Summary

New Hampshire should create a program to develop a market for durable wood products. When wood is used to make products that have lasting value and are held for long periods of time, carbon is stored and not released into the atmosphere. Consumers often have a choice between a product made from petroleum or mineral base and one made from wood. The purchase decision is often formed around price and a short-term, throw-away mentality. An effective education campaign could be mounted to change consumer thinking that favors durable wood products over other materials when buying homes, building materials, furniture, and other accoutrements of modern living. Durable wood products are often more economical in the long run – if not initially – and, unlike petroleum- or mineral-based products, are environmentally sustainable. The proposed program would provide additional benefits to New Hampshire's economy while improving product manufacturing and transportation efficiency.

Program Description

1. Mechanism (*i.e., how the policy or program achieves the desired result*): State agencies collaboratively use their most effective outlets to educate the public on the values of choosing wood products. The message would also give the rationale to buy locally made products whenever possible.

2. Implementation Plan (*i.e., how to implement the specific policy or program*)
   a. *Method of Establishment (e.g., legislation, executive order):* The Governors Office would direct state agencies with the appropriate education departments or media contacts to coordinate develop and disseminate an effective educational campaign. This should include a monitoring effort to gauge the success of the campaign with an adjustment period if necessary.
   b. *Resources Required:* A set of facts and figures that the agencies can use to base their messages. These should be well researched and defendable if questioned.
   c. *Barriers to Address (especially for medium to low feasibility actions):* Barriers include other priorities that are already assigned to these agencies that have strong support from within or without and probable lack of additional, new funding to finance this effort.

3. Parties Affected by Implementation (*i.e., residents, businesses, municipalities, etc.*)
   a. *Parties Responsible for Implementation:* State agencies such as UNH Extension would be responsible. There are many small, industry, land owner and professional associations that would help but their resources are small and they could be perceived by the public as being biased.
   b. *Parties Paying for Implementation:* NH taxpayers, either as changed priorities or funded by the legislature, would pay.
   c. *Parties Benefiting from Implementation:* New Hampshire citizens and residents of the world would be the beneficiaries. The New Hampshire economy could benefit greatly if the program is successful and revitalizes the sawmilling industry in the state. It could encourage secondary manufacturing as well.

4. Related Existing Policies and Programs (*i.e., those that address similar issues without interacting*): The proposed action is somewhat related to "green labeling" of renewable products. That is, durable wood products are renewable. Even though they are long lasting and we expect to store carbon in them, when they are recycled back to the ecosystem they are essentially renewed and would be considered a "green" tag product.

5. Complementary Policies (*i.e., those that achieve greater reductions through parallel implementation*)

a. *Existing:* Various Certification programs encourage stewardship plans that wood grow trees to financial maturity. Forest managed in this way will produce a higher percentage of quality, sawtimber which in turn would be used to produce durable wood products.

b. *Proposed:* Carbon cap-and-trade markets will encourage more conservative management strategies. These will result in maintaining higher stocking levels and longer rotations or cutting cycles. This will result in substantially higher yields of quality sawtimber and therefore durable wood products. Any success in "purchasing local" campaigns or in introducing secondary manufacturing for local markets can reduce transportation, therefore fuel used and carbon released.

6. Timeframe for Implementation: As soon as administratively possible. The wood using industry is currently depressed, affecting the entire New Hampshire economy. This effort would get the recovery started.

7. Anticipated Timeframe of Outcome: It could take up to a year for the effect of changes in consumer choices to reach back to saw mills. Helping to convince retailers to buy locally could have a much quicker effect.

Program Evaluation

1. Estimated CO_2 Emission Reductions
   a. Short-term (2012): 0.10 $MMTCO_2e$/year
   b. Mid-term (2025): 0.10 $MMTCO_2e$/year
   c. Long-term (2050): 0.10 $MMTCO_2e$/year

2. Economic Effects
   a. Costs
      i. Implementation Cost: Low (0-$2.5 million)
      ii. Timing: Constant / even
      iii. Impacts: State government
   b. Savings
      i. Potential Economic Benefits: Moderate ($25 million to $125 million)
      ii. Timing: Constant / even
      iii. Impacts: Business

3. Other Benefits/Impacts
   a. *Environmental*: Land managed to yield higher amounts of durable wood products will have less visual impact and will be more compatible with other uses. Lesser amounts off fusel fuel are needed to make wood based products than similar petroleum or mineral based products. Durable wood products are less likely to end up in a landfill.
   b. *Health*: There are fewer toxic fumes released to the atmosphere in the production of durable wood products versus mineral or petroleum based alternatives.
   c. *Social*: Studies show that people have a warm feeling are calmer or more comfortable when associated with natural wood versus plastic, steel or concrete.
   d. *Other*: Wood is a renewable resource, which can be harvested to benefit the New Hampshire economy.

4. Potential for Implementation (*i.e., including challenges, obstacles and opportunities*)
   a. *Technical*: Most of the information is already developed.
   b. *Economic*: This could be a matter of establishing priorities for state employee's time or recognizing the potential value to the New Hampshire economy and budgeting funds to finance employees' time.
   c. *Statutory/Regulatory*: Unless this is to receive special financing, nothing new would be needed.

d. *Social*: The time is right for this. Climate change is in the news every day, it is on peoples minds. People are already changing their behaviors in other ways.

5. Other Factors of Note:

6. Level of Group Interest:

7. References:

AFW Action 2.2.1 – Maintain Infrastructure for Biomass Production and Support Regulatory and Business Efficiencies

Summary

New Hampshire should help to maintain its infrastructure for biomass production through policies that aid – or at least do not impede – forestry-related businesses in New Hampshire. The forest industry has long been one of the cornerstones of New Hampshire's economic health. Historically, pulp mills, sawmills, and the production of firewood for home heating have provided the logging industry in this state with diverse markets for their wood. However, New Hampshire has recently seen the loss of pulp and paper production in Berlin and Groveton, as well as a reduction in sawmill capacity for both hardwood and softwood mills. Relatively new markets, such as the production of electricity from wood chips (biomass) and the production of wood pellets for heating residential and public buildings, have provided needed markets for low-grade wood and have helped to strengthen existing logging infrastructure. Because these markets reduce New Hampshire's reliance on fossil fuels and our dependency on foreign energy supplies, they bolster the local economy while simultaneously reducing the state's carbon footprint.

Program Description

1. Mechanism (*i.e., how the policy or program achieves the desired result*): By limiting restrictive rules and regulations that would make producing forest products difficult, New Hampshire can help logging companies and related businesses to operate in an atmosphere conducive to success. Allowing state-regulated utilities to develop renewable biomass generation would provide additional markets for low-grade wood fiber.

   Relevant policies and actions may include, but are not limited to, the following:

   a. Maintain and upgrade E-2 bridges so that forest products may take the most direct route possible from stump to market.
   b. Consider restricting municipalities from enacting rules or regulations regarding forest harvesting over and above state regulations.
   c. Continue to support the certification of 100,000-pound loads for the transportation of forest products.
   d. Continue to support fair and equitable Workman's Compensation Insurance rates for the forest industry job classifications.
   e. Educate the general public as to the benefits of forest management.
   f. Promote forest management and harvesting on public lands.
   g. Continue to support the Baccalaureate and Associates Degrees Forestry Schools at the University of New Hampshire.
   h. Support work force training programs such as the Logger Certification Program.
   i. Allow state-regulated utilities to add renewable generation.

2. Implementation Plan (*i.e., how to implement the specific policy or program*)

   a. *Method of Establishment (e.g., legislation, executive order)*: Through the careful monitoring of proposed rules and laws that would inhibit and/or otherwise restrict the harvesting of wood, the legislature would need to change existing law to allow state regulated utilities to add renewable generational assets.
   b. *Resources Required*: Some state monetary resources would be needed to maintain/upgrade E-2 bridge infrastructure.

c. *Barriers to Address (especially for medium to low feasibility actions)*: Both local and state governing bodies would have to try to limit enacting legislation or rules restricting the harvesting, transportation of forest products.

3. Parties Affected by Implementation (*i.e., residents, businesses, municipalities, etc*.)

   a. *Parties Responsible for Implementation*: State government and municipal leaders.

   b. *Parties Paying for Implementation*: State government.

   c. *Parties Benefiting from Implementation*: The forest industry as a whole would benefit. Logging contractors would have less bureaucracy to deal with, as well as additional markets for low grade fiber, thus making them more efficient. Industries using forest products would benefit from a more efficient and cost effective wood supply infrastructure.

4. Related Existing Policies and Programs (*i.e., those that address similar issues without interacting*)

5. Complementary Policies (*i.e., those that achieve greater reductions through parallel implementation*)

   a. *Existing*:

   b. *Proposed*:

6. Timeframe for Implementation: Each legislative session.

7. Anticipated Timeframe of Outcome: Businesses would benefit immediately after implementation.

<u>Program Evaluation</u>

1. Estimated CO_2 Emission Reductions: Analysis combined with AFW 2.2.2 & AFW 2.2.3

   i. Short-term (2012): 1.63 $MMTCO_2e$ /year
   ii. Mid-term (2025): 1.81 $MMTCO_2e$ /year
   iii. Long-term (2050): 2.25 $MMTCO_2e$ /year

2. Economic Effects

   a. Costs

      i. Implementation Cost: Moderately low ($2.5 million to $25 million)
      ii. Timing: Constant / even
      iii. Impacted: State Government

   b. Savings

      i. Potential Economic Benefits: Moderate ($25 million to $125 million)
      ii. Timing: Constant / even
      iii. Impacted: Business

3. Other Benefits/Impacts

   a. *Environmental*: There would be an increase in the health of forest stands and the associated improvements in wildlife habitat. This would reduce emissions of carbon dioxide, greenhouse gases, and other primary air pollutants in order to mitigate the effects of climate change and pollution of our ecosystems. This would lead to improved air and water quality directly as well as have more indirect effects on the fish and wildlife and the ecosystems upon which they depend.

b. *Health*: Human health benefits will be realized by decreasing exposure to toxic and hazardous pollutants, many of which may have an effect that is exacerbated by the increase in hot summer days. Avoiding the impacts of air pollution can reduce the incidence of cardiac and respiratory disease.

c. *Social*: Alternative generation technologies typically have short-term payback periods and can then provide savings for consumers and economic security for the State in the mid to long-term. By producing energy sustainably and domestically, the economy will benefit through increased jobs within the state.

d. *Economic*: Healthier forest products industry would in turn generate more economic activity for the state's economy.

4. Potential for Implementation (*i.e., including challenges, obstacles and opportunities*)

   a. *Technical*: There are no technical barriers to implementation.

   b. *Economic*: The proposed action would result in a significant increase in economic activity in all aspects of the forest industry.

   c. *Statutory/Regulatory*: The state should allow by statute all state regulated utilities to add renewable generation.

   d. *Social*:

5. Other Factors of Note:

6. Level of Group Interest:

7. References:

AFW Action 2.2.2 – Ensure Biomass Consumption is within Sustainable Limits

Summary

New Hampshire's forested lands should be managed to sustainably provide forest products and energy resources over the long term. Forest biomass represents significant new opportunity to meet demands for both thermal and electric energy. However, biomass stocks to support this demand are not unlimited, and biomass is only one of many benefits we realize from our forests. Biomass consumption needs to be maintained within the biological capacity of the land to grow fiber; should not compromise biological diversity, water quality, recreational values and aesthetics; and should complement the existing forest products economy.

Program Description

1. Mechanism (*i.e., how the policy or program achieves the desired result*): Understand the capacity of the forest to supply woody biomass across the landscape on a sustainable basis and support sustainable forest management for individual land ownerships. This would provide New Hampshire with a stable supply of energy over the long term as well as create a stable industry by ensuring a continuous supply of biomass.

2. Implementation Plan (*i.e., how to implement the specific policy or program*)

    a. *Method of Establishment (e.g., legislation, executive order)*

        i. The New Hampshire Energy Facility Site Evaluation Committee permits bulk power facilities over 30 MW and should consider wood supply as a factor related to the orderly development of the region. Other legal or regulatory frameworks include the state's RPS, RGGI, and the interstate NEPOOL. None of these frameworks addresses thermal users or wood supply issues. Studies on wood availability are within the scope of state forestry agencies, the U.S. Forest Service, and several non-governmental entities.

        ii. Sustainable management of individual land ownerships can be promoted through independent third-party green certification of both public and private lands, with public lands setting an example and supporting the demand for certified products. In addition, sustainable management is promoted through Recommended Voluntary Forest Management Practices called for in state statute. Sustainable management can also be incorporated into the procurement practices of wood consumers such as those promoted through the Sustainable Forestry Initiative.

    b. *Resources Required:* Funds and data sufficient to prepare a comprehensive regional wood availability analysis. Funding to conduct independent third party green certification of state lands. Funding and administrative structures such as cooperatives to aggregate forest lands to be certified and to provide certified forest products.

    c. *Barriers to Address (especially for medium to low feasibility actions)*

        i. The reliance on the market place and individual project developers to conduct their own confidential due diligence around wood supply.

        ii. The lack of a regional approach to wood supply and forest management.

        iii. The unfair playing field created when requiring one wood consumer type to comply with standards when competing users do not have to comply.

        iv. The byproduct nature of wood biomass.

v. The lack of understanding of and engagement in green certification programs by public and private landowners.

3. Parties Affected by Implementation (*i.e., residents, businesses, municipalities, etc.*)
    a. *Parties Responsible for Implementation*: Project developers, existing wood using facilities, public and private landowners.
    b. *Parties Paying for Implementation*: Not identified.
    c. *Parties Benefiting from Implementation*: Project developers, existing wood using facilities, public and private landowners who benefit from long term sustainable markets. Residents who live or visitors to forested portions of the state and public and private organizations whose mission is sustainable management of forests for a broad range of benefits.

4. Related Existing Policies and Programs (*i.e., those that address similar issues without interacting*): Not fully identified. May include some items mentioned above.

5. Complementary Policies (*i.e., those that achieve greater reductions through parallel implementation*):
    a. *Existing*:
    b. *Proposed*:

6. Timeframe for Implementation: Prior to broad expansion of biomass consumption.

7. Anticipated Timeframe of Outcome: In perpetuity.

Program Evaluation

1. Estimated CO_2 Emission Reductions: Analysis combined with AFW 2.2.1 & AFW 2.2.3
    i. Short-term (2012): 1.63 $MMTCO_2e$ /year
    ii. Mid-term (2025): 1.81 $MMTCO_2e$ /year
    iii. Long-term (2050): 2.25 $MMTCO_2e$ /year

2. Economic Effects
    a. Costs
        i. Implementation Cost: Low (0-$2.5 million)
        ii. Timing: Constant/Even
        iii. Impacts: Government - State
    b. Savings
        i. Potential Economic Benefits: Supporting Mechanism
        ii. Timing:
        iii. Impacts: Business

3. Other Benefits/Impacts
    a. *Environmental*: Intact tracts are forest are better able to sustain biological diversity and healthy wildlife populations and play a role in the overall provision of ecosystem goods and services such as water supply provision.

b. *Health*: Forests may also contribute to human health through beneficial impacts on air quality and mental health.

c. *Social*: Sustainable backdrop for recreation and tourism industry. To the extent forested lands can be protected and remain productive, we increase the chance of maintaining the iconic character of our state and its natural resource industries in the long-term.

d. *Economic*: Sustain the short and long term stable market for full range of forest products.

4. Potential for Implementation (*i.e., including challenges, obstacles and opportunities*)

   a. *Technical*: Potential data limitations.

   b. *Economic*: Costs of certification are not fully recovered in product sales.

   c. *Statutory/Regulatory*: Unknown

   d. *Social*: Identifying and supporting the threshold where renewable energy production and sustainable healthy forests are in balance.

5. Other Factors of Note:

6. Level of Group Interest:

7. References:

- Biomass Energy Resource Center, Northern Forest Biomass Energy Action Plan, 2007.
- NH Department of Resources and Economic Development, New Hampshire Forest Resources Plan, 2006.

AFW Action 2.2.3 – Ensure the Most Efficient Use of Energy/Biomass Stock

Summary

New Hampshire should develop plans to identify facilities that utilize biomass and encourage the most efficient use of the resource to reduce energy use and greenhouse gas emissions. The economics and supply of wood biomass for energy or thermal heat production are complex and have many important variables. Planners, producers, potential suppliers, marketers, investors, governments, regulators, and consumers need some understanding of these factors and the underlying resource data to make good decisions about the efficient use of the available resource. Low-grade wood material appropriate for power generation or thermal heat production is limited in availability, and its value is quickly diminished by the cost of transportation or distance it must be transported. Careful planning of the location of new, large consumers of biomass can help to preserve the efficiency of the industry.

Program Description

1. Mechanism (*i.e., how the policy or program achieves the desired result*)

   In the current energy market, wood biomass is only affordable as a byproduct of harvesting higher-value materials. In other words, higher returns are needed from the sale of saw timber and pulpwood to finance some of the costs of harvesting low-grade, energy wood – primarily top wood, branches, saw mill waste, and other material not fit to make lumber or paper. The standards can vary depending on market conditions and hauling distances to the end points. The supply or availability of biomass can vary with demand for the other products. Growing conditions, soil productivity, tree species composition, and forest age varies throughout the state.

   This variation results in different potentials for supply of biomass from different areas. To address this situation, state agencies should develop information about wood supply potential and current market forces for the different areas of the state. This would include an analysis of transportation issues effecting delivery costs at marketing points.

   There is a higher efficiency of energy conversion from wood biomass to thermal heat than to electricity generation. Wood is grown and harvested in all communities in the state. There are opportunities to heat public complexes, buildings, private developments, individual homes, or even entire communities with wood biomass throughout the state. The public buildings or communities where biomass heating and cooling are a viable option should also be identified in order to exploit this energy resource most effectively.

   Some areas of the state where the wood supply is most abundant lack the electrical transmission line capacity necessary to locating wood-fired generation facilities there. Consequently, an assessment is needed of the physical limitations and other barriers to efficient development of electrical generation capacity using wood biomass as fuel.

   Existing wood-fired power plants produce “waste” heat that could support other heat-using industries. A promotion group could be contracted to find businesses needing an economic heat source and willing to relocate their operations adjacent to existing power generating facilities.

2. Implementation Plan (*i.e., how to implement the specific policy or program*)

   a. *Method of Establishment (e.g., legislation, executive order)*: Additional funding and personnel would be required within existing agencies.

b. *Resources Required:* The Division of Forests and Lands would need additional funding and personnel to modify and build on the Forest Service inventory of forest resources. Additional information would be needed to bring more accuracy to local levels and intent-to-cut permits should be monitored to keep the data base current. A data base of public buildings and schools already exists. It could be improved with a survey to determine the current age and type of heating and cooling system they have.

c. *Barriers to Address (especially for medium to low feasibility actions)*: There will be resistance to increasing budgets and staff. There could be a perception that this could take business from consultants who do this kind of work for individual firms or investors. Also, that making this information available to all, may take away some competitive advantage from some who have already developed that market.

3. Parties Affected by Implementation (*i.e., residents, businesses, municipalities, etc.*)

   a. *Parties Responsible for Implementation*: Developing a statewide forest resource and transportation base inventory is a large task with a lot of responsibility.

   b. *Parties Paying for Implementation*: It would require some investment by state tax payers.

   c. *Parties Benefiting from Implementation*: The greatest benefits would be to avoid making some big mistakes like over committing one resource base or not taking advantage of a readily available forest base that is currently under utilized or the products are of marginal value due to very long haul distances to market.

4. Related Existing Policies and Programs (*i.e., those that address similar issues without interacting*):

5. Complementary Policies (*i.e., those that achieve greater reductions through parallel implementation*)

   a. *Existing*:

   b. *Proposed*:

6. Timeframe for Implementation: It could take a year to fine-tune an inventory and data base that serves needs but doesn't cost more than required.

7. Anticipated Timeframe of Outcome: Once the inventory process is developed, it could take several years to build a reliable data base. Earliest user date would be 2011.

<u>Program Evaluation</u>

1. Estimated CO_2 Emission Reductions: Analysis combined with AFW 2.2.1 & AFW 2.2.2

   a. Short-term (2012): 1.63 $MMTCO_2e$ /year
   b. Mid-term (2025): 1.81 $MMTCO_2e$ /year
   c. Long-term (2050): 2.25 $MMTCO_2e$ /year

2. Economic Effects

   a. Costs

      i. Implementation Cost: Low (0-$2.5 million)
      ii. Timing: Constant / even
      iii. Impacts: State government

   b. Savings

      i. Potential Economic Benefits: Supporting Mechanism
      ii. Timing:

iii. Impacts: Business

3. Other Benefits/Impacts

    a. *Environmental*: The proposed action would reduce emissions of carbon dioxide, greenhouse gases, and other primary air pollutants in order to mitigate the effects of climate change and pollution of our ecosystems.

    b. *Health*: Human health benefits will be realized by decreasing exposure to toxic and hazardous pollutants, many of which may have an effect that is exacerbated by the increase in hot summer days. Avoiding the impacts of air pollution can reduce the incidence of cardiac and respiratory disease.

    c. *Social*: Alternative generation and energy efficiency technologies typically have short-term payback periods and can then provide savings for consumers and economic security for the State in the mid to long-term. By producing energy sustainably and domestically, the economy will benefit through increased jobs within the state.

    d. *Other*:

4. Potential for Implementation (*i.e., including challenges, obstacles and opportunities*)

    a. *Technical*: May be difficult to plan, but once implemented, the issue of increasing energy efficiency and more appropriate biomass allocation becomes more feasible.

    b. *Economic*: It may be resource intense at first, but over the long term it can reduce the flow of energy dollars out of the state, and enable more energy dollars to flow into the state.

    c. *Statutory/Regulatory*: There may be existing statutes and policies that restrict the potential to utilize this resource in the short-term.

    d. *Social*: There should be wide public support as these efforts could lead to more jobs and greater energy and economic security at a time when prices are rising.

5. Other Factors of Note:

6. Level of Group Interest:

7. References:

AFW Action 1.1.3 – Protect Agricultural Land

Summary

There should be a greater emphasis on preserving existing agricultural land. The conversion of agricultural land to developed land affects its carbon absorption capacity. New Hampshire should promote policies and practices that avoid releases of carbon stored in soils, preserve the carbon absorption capacity of existing agricultural lands, and enable continued carbon sequestration from the atmosphere. Available measures include acquiring and preserving open space, reducing sprawl through smart growth measures, and encouraging the reuse of existing infrastructure.

Program Description

1. Mechanism (*i.e., how the policy or program achieves the desired result*): When land is developed, the carbon that is stored in the soil is released into the atmosphere as carbon dioxide. Once land is developed, its potential to store carbon is significantly reduced as a result of the lower levels of biological activity occurring. Therefore, development contributes to climate change not only by releasing stored carbon into the atmosphere but also by reducing the capacity of soils to absorb CO_2 from the atmosphere.

2. Implementation Plan (*i.e., how to implement the specific policy or program*)
    a. *Method of Establishment (e.g., legislation, executive order):* Local, state, and federal conservation easement programs (dependent on appropriations from their governing bodies).
    b. *Resources Required:* Funding
    c. *Barriers to Address (especially for medium to low feasibility actions):* There may be competing land use demands in growing communities that may be seeking to increase their tax bases.

3. Parties Affected by Implementation (*i.e., residents, businesses, municipalities, etc.*)
    a. *Parties Responsible for Implementation:* Local, state, and federal governments, and non-profit organizations.
    b. *Parties Paying for Implementation:* Local, state, and federal government, and non-profit organizations.
    c. *Parties Benefiting from Implementation:* Farmers, farming communities, and the public at large benefit from the preservation of agricultural lands and other open spaces.

4. Related Existing Policies and Programs (*i.e., those that address similar issues without interacting*): Local, state (LCHIP), federal and non-profit organizations are all involved in conservation easement programs that protect valuable farmlands from conversion to residential and commercial uses.

5. Complementary Policies (*i.e., those that achieve greater reductions through parallel implementation*)
    d. *Existing:*
    e. *Proposed:* AFW Action 1.1.1 – Increase Cover Crops
    AFW Action 1.1.2 – Increase Conservation Tillage/No-Till Farming Practices

6. Timeframe for Implementation: Immediate

7. Anticipated Timeframe of Outcome: Immediate

Program Evaluation

1. Estimated CO_2 Emission Reductions: Action not individually quantified; included as part of TLU Land Use Actions.

2. Economic Effects

    c. Costs

        i. Implementation Cost: Moderately low ($2.5 million to $25 million)
        ii. Timing: Constant / even
        iii. Impacts: Local government

    d. Savings

        i. Potential Economic Benefits: Moderately low ($2.5 million to $25 million)
        ii. Timing: Low short-term / mostly long term
        iii. Impacts: Evenly distributed

3. Other Benefits/Impacts

    a. *Environmental*:

    b. *Health*:

    c. *Social*: Maintaining farmlands and other open spaces is a key component of many master plans in New Hampshire communities. To the extent that local farmland can be preserved and remain productive, we avoid greater dependence on foodstuffs imported from afar and avoid the environmental impacts associated with transporting food over long distances.

    d. *Other*:

4. Potential for Implementation (*i.e., including challenges, obstacles and opportunities*)

    a. *Technical*:

    b. *Economic*: Rising land values have made purchase of conservation easements relatively more expensive in recent years.

    c. *Statutory/Regulatory*:

    d. *Social*: Local, state, and federal conservation easement programs are dependent on the support of their governing bodies.

5. Other Factors of Note:

6. Level of Group Interest:

7. References:

AFW Action 3.1 – Maximize Source Reduction, Reuse and Recycling

Summary

Commercial and residential source reduction and recycling programs should be expanded and promoted in municipalities through the development of a state operated revolving loan fund in order to address waste generation and disposal rates and reduce the greenhouse gas emissions associated with the life-cycle of products. This fund would be used to establish programs that cover the initial capital costs so that the substantial cost reductions can be realized over the short and long-term. While reducing municipal budgets, this fund would also enable significant greenhouse gas emissions reductions. A substantial portion of the solid waste stream is composed of materials that have significant embodied energy[2] content and that can be recycled or reused. The fraction of the waste stream that can be recycled or reused can displace the emissions associated with producing new materials from virgin raw materials.

Program Description

1. Mechanism (*i.e., how the policy or program achieves the desired result*):

While New Hampshire's greenhouse gas inventory only considers the amount of greenhouse gas emissions that are released during the breakdown of materials in landfills, New Hampshire can facilitate the reduction in production related emissions in other states by significantly avoiding the generation of waste. The production-related emissions of materials are ~10 times higher than landfill emissions due to the energy associated with the mining, harvesting, processing and producing materials and products. A substantial portion of the solid waste stream is composed of materials that have significant embodied energy content and that can be recycled or reused. The fraction of the waste stream that can be recycled or reused can displace the emissions associated with producing new materials from virgin raw materials. The current recycling rate in New Hampshire is less than 21 percent, well below the national average of 32 percent. There are a number of potential strategies that can be applied to improve the state's recycling rate. For most households, the amount of waste that can be reduced, reused, recycled, or composted is a major portion of the original total waste volume.

There are a number of actions that can be taken to improve source reduction and recycling rates in New Hampshire. By developing a revolving loan fund that can enable these and other programs to be developed, through outreach, program development assistance and short-term loans to cover the initial capital costs, the State can help municipalities develop the incentives and programs that: reduce the amount of raw materials used; encourage the reuse and recycling of materials and products; and discourage single-use waste. The municipal source reduction and recycling programs could significantly reduce, and even potentially eliminate, the funds that municipalities need for waste disposal.

These programs could include:

- *Implement Resource Management Contracting*
  Resource management contracting relies on creating incentives such that the contracting waste hauler receives revenue from sorting and selling recyclable materials. This could include the cost transfer of tipping fees to the contracting waste hauler to provide a disincentive for the disposal of waste to a landfill or incinerator. This provides a financial incentive to the contracting waste hauler to maintain effective collection programs and to ensure appropriate sorting and recycling.

- *Developing Transfer/Recycling Center Collaborations*

[2] Embodied energy refers to the energy that is required to extract, process, package, transport, install, and recycle or dispose of materials and products.

Establish central consolidation facilities that have both equipment and storage capacity and prepare materials for market and to preserve its value. This enables smaller municipalities to pool their resources and maintain cleaner material streams (e.g., sorted glass, aluminum, tin) with higher market values.

- *Implementing Pay-As-You Throw (PAYT) Programs*
  Under this program users pay to dispose of waste on a volume or weight basis which directly links user disposal cost to the amount of waste they generate. Traditional waste management costs are spread equally across all residents and low volume waste generators subsidize the higher volume generators disposal costs. The fee that is assessed for each bag or can of waste, or each pound of trash, provides an incentive for households to generate less waste, reuse what they can, compost certain organics, and recycle what remains. This type of program can lead to reduction in waste generation by 14 to 27% while increasing recycling by 32 to 59%.

- *Increasing the Salvage Reusable Building Materials*
  Salvage of reusable building materials, sometimes called "deconstruction," is growing in popularity. Some buildings slated for demolition contain valuable furnishings and fixtures, high-value wood flooring, molding and structural lumber, and other materials that can be reused, such as doors and sinks. The State could provide incentives, such as grants, to help establish an infrastructure of reusable building materials sites. Presumably, the incentives would primarily support capital and other start-up expenses, as revenue from the re-sale of materials should be sufficient to pay for ongoing operational costs. In addition to environmental and resource benefits, building material salvage provides more affordable materials to middle- and lower income households. Material salvage programs can also provide living-wage jobs.

- *Promotion of Commercial and Municipal Composting Operations*
  The State can encourage the establishment of municipally and commercially operated composting facilities capable of handling the yard and food waste that makes up more than 20 percent of the US waste stream. Leaf and yard waste is also easily composted, which allows us to treat the material as a resource rather than a waste. Composting of yard and food wastes can significantly reduce net GHG emissions, both by reducing methane emissions from landfills and by sequestering carbon in agricultural soils treated with finished compost. While leaf and yard waste compost operations do not require a permit, food waste composting operations, even when operated at high standards, can create odor problems. Due to this, commercial food waste composters may require major capital investments, such as mechanical aeration systems with biofilters or totally enclosed composting operations, in order to operate and require assistance getting started.

2. Implementation Plan (*i.e., how to implement the specific policy or program*)

   a. *Method of Establishment (e.g., legislation, executive order):* Establishment of the revolving loan fund would require legislation and could be funded through a short term one cent fee on all bottles sold in the state. Solid waste management is handled at the local level and some programs would be established through local ordinances while others would require legislative action and State level implementation and coordination.

   b. *Resources Required:* Funding the revolving loan fund for additional staff that would be required to conduct outreach to municipalities and to assist in program development. Once established, some programs would be self-funded (PAYT) through the monies generated by the program.

   c. *Barriers to Address (especially for medium to low feasibility actions):* There may be resistance to a perceived tax, even if so small and to the apparent growth in State government, even if such growth will result in much larger savings to communities over the long-term.

      Municipalities meet with resistance from some residents, who do not want to be "charged" for disposing of their trash. The residents need to understand that they are already paying for solid waste

disposal in their property taxes (the statewide average is $242 annually), and there will be a savings in taxes that will offset the fee for the bags, unless they don't recycle or they have a very large family. Additionally, there is sometimes the concern that illegal dumping will occur, but this has not proved to be a significant problem in implementing towns.

3. Parties Affected by Implementation (*i.e., residents, businesses, municipalities, etc.*)
    a. *Parties Responsible for Implementation*: Manufacturers, relevant trade associations, consumers associations, all state and local agencies, consumers, and retail outlets. The NHDES Waste Management Division would develop regulations, and provide guidance and conduct outreach as needed. Municipalities would need to pass ordinances to implement some programs and the legislature may be needed to establish others.
    b. *Parties Paying for Implementation*: Product purchasers and to a smaller degree tax payers.
    c. *Parties Benefiting from Implementation*: Tax-payers as New Hampshire communities with PAYT programs have reported average reductions in waste amounts ranging from 25 to 35 per cent. Municipalities and residents can expect a corresponding decrease in their solid waste disposal costs.

4. Related Existing Policies and Programs (*i.e., those that address similar issues without interacting*): Solid waste is often the third or fourth highest line item in town budgets, so the cost savings are important.

5. Complementary Policies (*i.e., those that achieve greater reductions through parallel implementation*)
    a. Existing: The New Hampshire Legislature has consistently endorsed recycling as a method to reserve the state's disposal capacity.
    b. Proposed:

6. Timeframe for Implementation: The fee to establish the revolving loan fund and required staff could be passed in the next legislative sessions. Municipalities would need to follow their own procedures for adopting ordinances.

7. Anticipated Timeframe of Outcome: The recycling rate will begin to increase as soon as the ordinances and programs become effective.

<u>Program Evaluation</u>

1. Estimated CO_2 Emission Reductions – Analysis not completed.
    a. Short-term (2012):
    b. Mid-term (2025):
    c. Long-term (2050):

2. Economic Effects
    a. Costs
        i. Implementation Costs: Moderately low ($2.5 million to $25 million)
        ii. Timing: Immediate / higher initial costs
        iii. Impacts: Consumers
    b. Savings
        i. Potential Economic Benefits: Moderate ($25 million to $125 million)
        ii. Timing: Constant / even

iii. Impacts: Government local

3. Other Benefits/Impacts

   a. *Environmental*: Land filling solid waste results in leachate that must be treated prior to discharge and may result in the release of methane, a potent greenhouse gas, into the atmosphere. Similarly, there is concern about emissions from the incineration of solid waste.

   b. *Health*: It is not unusual for people living near landfills to complain about negative health effects from the odors. Leachate that escapes from a landfill can also impact surface and groundwater sources of drinking water.

   c. *Social*: There is significant resistance to new and expanded landfills and incinerators due to concerns about diminishing property values and health impacts. PAYT also institutes an equitable system that requires residents to only pay for their own trash and not subsidize the costs for their neighbors who don't recycle or use more than their fair share of disposal services.

   d. *Economic*: There can be significant job growth from the recycling industry.

4. Potential for Implementation (*i.e., including challenges, obstacles and opportunities*):

   a. *Technical*: There are no technical barriers to implementation.

   b. *Economic*: Because waste reduction programs like PAYT has been shown to result in cost savings, there is significant economic benefit to implementation.

   c. *Statutory/Regulatory*: Legislation is required to establish the fee that will fund the additional staff and revolving loan fund.

   d. *Social*: The opposition to programs such as PAYT is minor in comparison to concerns about property values, health impacts and odors. Illegal dumping has not been a problem for most communities.

5. Other Factors of Note:

6. Level of Group Interest: high

7. References:

Composting

- NHDES Fact Sheet, "Municipal Composting of Yard Waste" (2007)

http://des.nh.gov/organization/commissioner/pip/factsheets/sw/documents/sw-3.pdf

Pay-As-You-Throw

- NHDES brochure, "Pay As You Throw: A Community Solution For The Rising Costs Of Solid Waste Disposal."

Resource Management Contracting

- http://www.epa.gov/wastewise/wrr/rm.htm
- http://www.epa.gov/wastewise/pubs/rr_rm.pdf